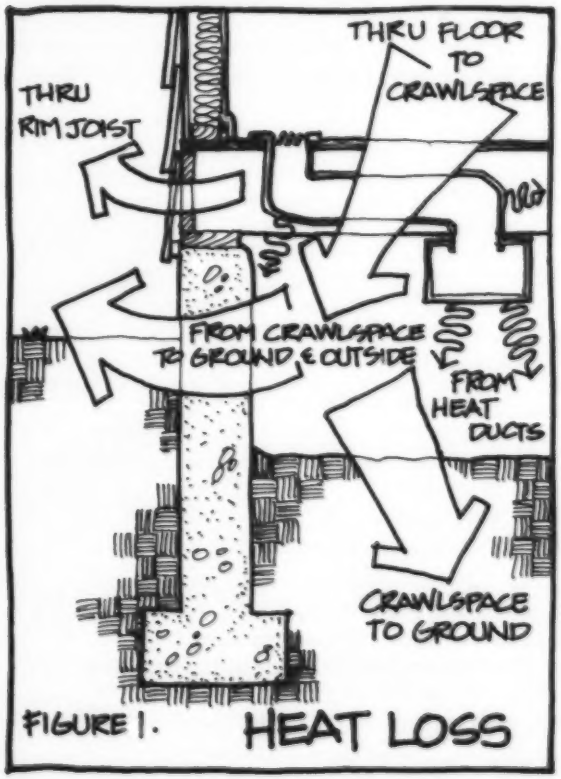
Crawlspace Insulation

Common Problems

During winter months, poorly drained crawlspaces or those with the ground uncovered, can attain humidity levels as high as 100 per cent. This moist air condenses on crawlspace surfaces such as rim joists, mud sills and the ends of floor joists, creating ideal conditions for wood rot and mildew. This ruins the crawlspace for storage and damages the structural support of the home.

If the ground in the crawlspace is not covered, moisture rising out of the soil can greatly increase the humidity levels in the house. This can result in persistent window condensation (even during mild winter weather) and mildew growth.

Many homes with a ventilated crawlspace have an uninsulated main floor. Winter temperatures and winds penetrate the crawlspace, accelerating heat loss through the floor. Turning up the thermostat will not prevent cold floors.



Dispelling The Myths

House building is adopting new techniques based on science and energy efficiency. But traditional construction methods and the reasons behind them can die hard...

"Soil Is A Good Insulator"

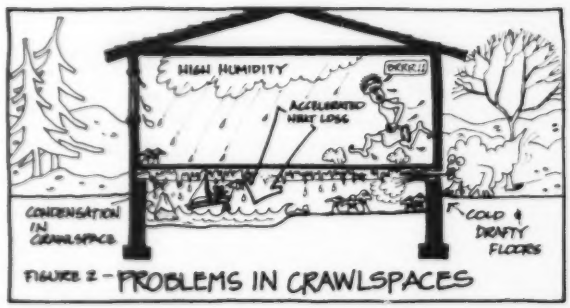
This far north soil is not an effective insulator. The earth is an enormous thermal mass with a low and relatively stable temperature. Although soil is more resistant to temperature change than the air outside, it is not an adequate insulation material.

"A Foundation Will Heave If It Isn't Heated"

There are no documented cases of unheated or insulated foundations heaving in Canada unless the foundation had poor or non-existent drainage. Freezing will cause a foundation to heave only if the soil around and under it is saturated with water. Dry soil will not heave even at -40^{0}C (-40^{0}F)!

"Water Equipment Will Freeze In An Unheated Crawlspace?"

Water pressure equipment housed in a crawlspace can be enclosed in an insulated room served by a small heating duct. This will ensure that equipment is not damaged by freezing. In most cases, crawlspace vents are closed during winter and the constant ground temperature will not allow the crawlspace air temperature to drop below 4^{0}C (+40^{0}F). Hot air ducts and hot water lines should be insulated to prevent heat loss.



Take Care Of Drainage First

If there is standing water in the crawlspace, it can be removed by:

1) sloping the crawlspace floor toward a central pit equipped with an electric sump pump (Figure 3a);

2) trenching around the exterior of the foundation walls to footing level, and installing weeping tile to move water away to a natural drain or storm sewer (Figure 3b).

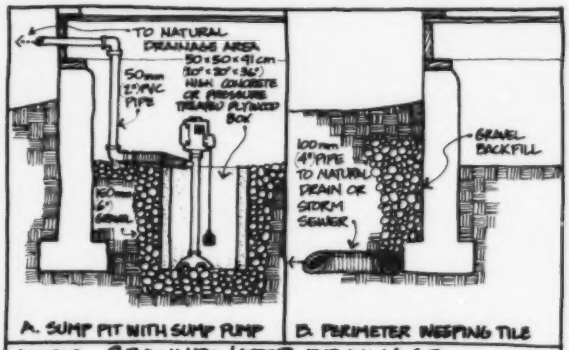

TO NATURAL DRAINAGE AREA
50mm (2") PVC PIPE
GRAVEL BACKFILL
100mm (4") PIPE TO NATURAL DRAIN OR STORM SEWER
A. SUMP PIT WITH SUMP PUMP
B. PERIMETER WEEPING TILE

FIGURE 3 GROUNDWATER DRAINAGE

Insulating The Crawlspace

Insulated Main Floor Method

The insulated main floor method is used when heat ducts are in place and the crawlspace is not needed as a warm storage area. Joist spaces must be completely filled with batt insulation. It can be supported by:

- stapling chicken wire or cord across the joist bottoms
- fastening masonite, plywood or olefin fibre sheeting to joist bottoms
- placing plywood strips between the floor joists on 1" x 4" ledges nailed along the bottom of the joists. **Do Not Use Polyethylene To Support The Insulation.** It would create a cold side vapour barrier, allowing moisture to condense on your floor joists and insulation.

Before covering the insulation make sure that water lines are wrapped in heat tape. Joints in heating ducts should be taped. Where ducts penetrate the main floor they should be caulked to the subfloor.

The ground in the crawlspace must be covered with 10mil polyethylene to stop ground moisture from evaporating and causing mildew, rot and window condensation. The polyethylene should extend up the wall to ground level. Protect the polyethylene ground sheet along service corridors or under access hatches with plywood or other rigid material.

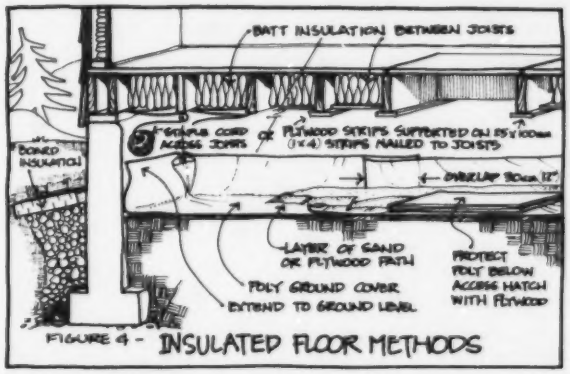

BATT INSULATION BETWEEN JOISTS
BOARD INSULATION
LAYER OF SAND OR PLYWOOD PATH
POLY GROUND COVER EXTEND TO GROUND LEVEL
PROTECT POLY BELOW ACCESS HATCH WITH PLYWOOD

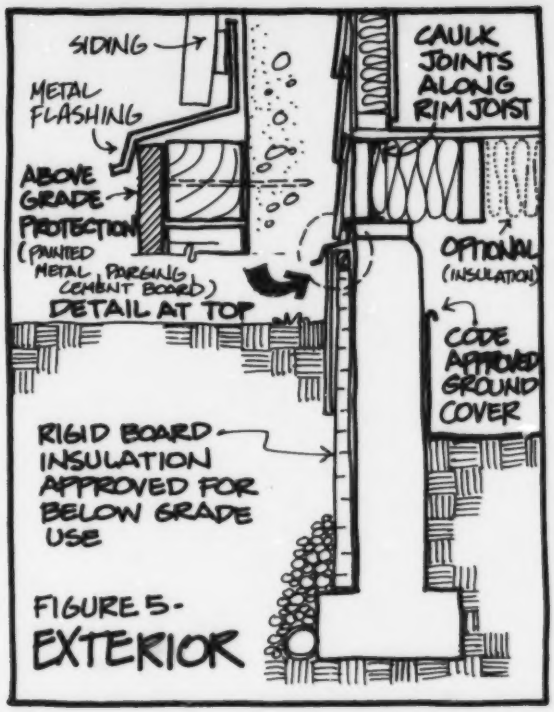
FIGURE 4 - INSULATED FLOOR METHODS

Insulated Foundation Method

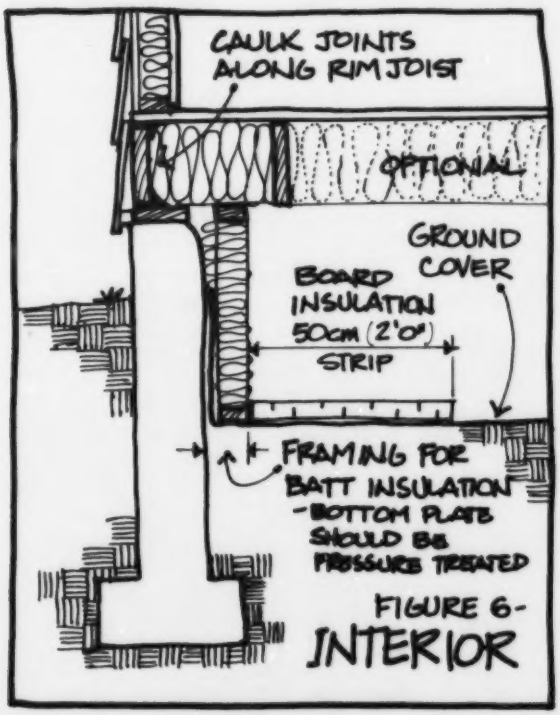
This is most often used where the crawlspace acts as a plenum for heat distribution. Two variations are used:

1) The exterior variation uses rigid insulation fastened to the foundation. This is done with galvanized concrete nails and washers, self-tapping concrete screws or a custom fastening system available from the insulation manufacturer. The top edge of the insulation is covered with flashing, and the exposed face of the insulation is protected by an expanded metal lath and two coats (one-half inch) of latex-modified or conventional masonry parging. Pressure-treated wood, painted sheet metal or cement board can also be used. The insulation should extend down as far as possible and have a minimum RSI value of 1.2 (R 7). Rigid insulations approved for below grade use include extruded or expanded (not Type 1) polystyrene and rigid glass fibre.

2) The interior variation is more energy efficient as it eliminates thermal bridging (a solid path for heat to travel) through the footing. Rigid insulation is attached to the wall with a suitable adhesive applied in a grid pattern. If batt insulation is used, a two-by-four framework with



a bottom plate of preserved wood is erected around the inside perimeter of the foundation walls to hold the insulation and vapour barrier in place. The ground is then covered with a 10 mil polyethylene vapour barrier. Two inches of rigid insulation are laid on the ground in a 60 cm (2 ft.) band around the interior perimeter of the crawlspace floor.



Ventilating The Crawlspace

All crawlspaces should be ventilated. Ventilation requirements are 0.1 m^2 (1 square foot) of unrestricted grill area for each 50 m^2 (538 square feet) of floor area. Cross ventilation with grills placed at opposite ends of the crawlspace is the most effective. Grills should not be placed in walls exposed to prevailing winter winds or automobile exhaust. The vents should have weatherstripping and be screened to prevent the entry of rain, snow, water, insects or rodents. The crawlspace is ventilated only during the summer; grills should have tight-fighting covers to ensure that heat is kept in the crawlspace during winter and cold air is kept out.

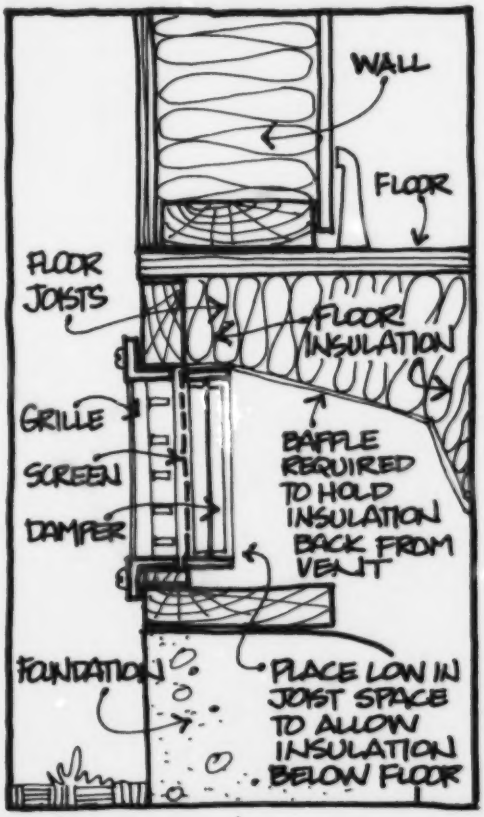


Figure 7 Ventilation

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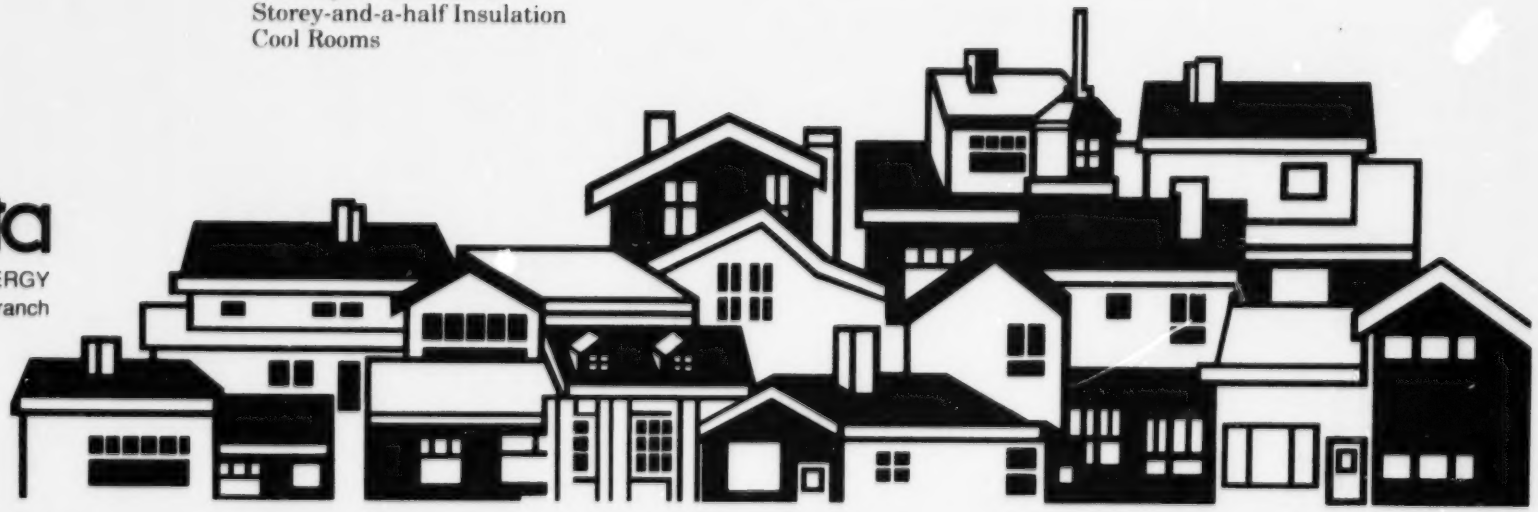

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